Ion Flux in Pulmonary Vascular Control, NATO ASI Series A, Life Sciences Vol. 251 by E. Kenneth Weir, Joseph Hume, and John T. Reeves, Editors

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This book is a collection of papers written by participants at the Grover Conference on the Pulmonary Circulation held in Sedalia, Colorado in October, 1992. The preface states the papers were written immediately afterwards, "with the advantage of that intense period of discussion." There may have been a lot of talk at the conference, but it is not evident that much listening went on. The papers do not reference each other, and there is little indication that paper content was modified in response to conference discussion. What emerges is a potpourri of reviews and experimental findings about vascular smooth muscle. Some deal with the pulmonary circulation, but many do not—in fact, some of the experiments are about uterine or colonic smooth muscle. Some papers pull findings together into well delineated conclusions; others simply shotgun some results and leave the reader to figure it out.

The pulmonary circulation has long mystified students and teachers alike, and these papers make it obvious why it is so mysterious. The term pulmonary vascular control in the book's title is perhaps a misnomer, because there is precious little in this collection of papers that gives one a sense that the pulmonary system is under any control at all. Pulmonary reactivity might be a better term. Such complexity is no fault of the contributors, obviously, and the editors can be congratulated for at least facing this daunting system head on. One paper or another makes a case for every conceivable paracrine or intracellular signaling mechanism that affects smooth muscle contraction, including the usual nitrovasodilators, eicosanoids, CICR, IP_3, ATP-sensitive K channels etc, plus redox-sensitive K channels, mechanosensitive cation channels, and flow-induced control of vascular tone. The depth of coverage and quality of writing is as varied as the topics. Van Breemen and Chen's brief review of intracellular calcium pools has no figures; in contrast, Sperelakis et al. write a treatise on smooth muscle sodium and calcium currents that has 24 figures. Voelkel's paper on the molecular basis for pulmonary hypertension has five figures, five tables, and two schemes, but only one of these has a legend. Some technique papers are excellent. Leblanc and Wan write a good practical paper on patch clamp technique, and Archer et al. offer a good description of intracellular Ca monitoring with FURA.

Some of the most interesting findings relate to the contrast between pulmonary hypoxic vasoconstriction and the hypoxic vasodilation usually attributed to most circulatory beds. Siegel et al. describe the role of hypoxia and prostacyclin analogs in mediating vasodilatation in nonpulmonary vessels, presumably by opening K channels, leading to hyperpolarization and inhibition of Ca entry. Then Benot et al. review their work on dispersed carotid body cells (glomus cells), demonstrating hypoxia-sensitive K channels that presumably serve to transduce hypoxia into K channel *closure*, depolarization and, hence, neural activity. The mechanism of transduction—for example, direct action on the channel by some chemical intermediate that is produced under reducing conditions, or dissociation of O_2 from a hemoglobin-like accessory molecule—remains a matter of speculation. This is followed by the paper of Post et al. (coauthored by two of the editors), describing analogous work in pulmonary artery smooth muscle cells in which hypoxia leads to K channel closure, ending with the same interesting speculation as to how a low pO_2 is transduced into reduced opening of K channels.

A concept that is probably new for many readers is developed in the paper by Bevan on flow-induced changes in vessel wall tension. He hypothesizes that the conformation of extracellular glycoproteins is modified by flow, leading to alteration of transmembrane cation flux. Although elucidation of mechanism dissolves into fuzzy speculation, the ideas are interesting.

The value of this book lies in its exposure of many of the possible mechanisms that might play a role in controlling the pulmonary circulation. For a graduate student looking for a thesis topic, this is a rich mine of ideas. On the other hand, an instructor of medical professionals hoping to enlarge his knowledge base will be overwhelmed by the endless description of channel activity and intracellular Ca release that has no discernable connection to control of the pulmonary vasculature. As in the world of sports, where pre-season team rankings make for interesting reading after the playing season is over, it will be interesting to see which of the plethora of putative biophysical mechanisms described in this collection of papers turn out to be truly significant in the control of the pulmonary vasculature, once a new generation of researchers has given us more definitive answers.